

X

T H E S I S

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B Y

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On the diagnosis of Chronic Empyema of  
the Antrum of Highmore.



## THE DIAGNOSIS OF CHRONIC EMPYEMA OF THE ANTRUM OF HIGHMORE.

Under the above heading I only intend to discuss the diagnosis of those cases of Empyema of the Antrum where the pus finds an outlet from the Antrum into the nasal cavity through the Ostium Maxillare. Where the pus does not so escape, we get accumulation of pus with consequent tension in the Antrum together with all the necessarily accompanying symptoms, such as acute pain, tenderness over the antral region, bulging of the antral walls, in some cases protrusion of the eye balls, rise of temperature and rigors. Such cases come under the general surgeon and call for immediate treatment, failing which the abscess will find an outlet for itself. The symptoms in these cases are so marked that the diagnosis is comparatively easy.

But in the cases of Chronic Empyema of the Antrum it is quite different. As Lennox Browne points out, "the ordinary symptoms usually described in text books such as dull aching pains in the cheek,

with heat, redness, and fulness of the soft parts externally, even to expansion of the whole jaw, are chiefly conspicuous by their absence". And even the few symptoms that one expects to find in these cases are sometimes so obscure that the diagnosis of Chronic Empyemas of the Antrum becomes at times exceedingly difficult.

Before, however, discussing the diagnosis let me touch upon one or two points in connection with the etiology of these cases, as a consideration of these is likely to aid us in the diagnosis of the Antral condition. The main causes of Empyema of the Antrum may be roughly classified under two distinct headings (1) Nasal (2) Dental. As to which of these is the more common cause of Antral Empyema I shall not attempt to decide. Authorities are pretty evenly divided in favour of one or other of these causes. But for my present purpose it is sufficient to recognise that both these causes are capable of producing suppuration in the Antrum. Therefore it becomes necessary to carefully investigate the condition of the teeth as well as of the nasal cavities in every



case of suspected Antral disease. The second point that I wish to touch upon in connection with the etiology of the antral disease is its relation to nasal catarrh. When we consider that "the nasal mucous membrane is continued through the openings into the (2) different sinuses" we can see how easy it is for a nasal catarrh to extend into the lining membrane of the Antrum. This extension of nasal catarrh into the lining membrane of the Antrum is denied by Bosworth. (3) But as he has not given any reasons upon which he bases his statements, I do not see why there should be any more impossibility for a catarrh of the nasal mucous membrane extending into the antral lining, than for a capillary bronchitis developing into a catarrhal pneumonia. And then, given an accumulation of mucous in a cavity communicating with the external air, through the nasal cavities (which by no means are inhospitable to septic germs) I do not see why a catarrhal condition of the Antrum should not become septic though Lennox Browne says "I myself (4) am not aware of any case in which a simple acute mucous catarrh has led to suppuration. The third

point in connection with etiology that I wish to refer to is the relation of polypus (mucous) of the nasal cavities to antral suppuration. This is important to consider as we find a great many of the cases of antral disease also show polypi in the nose. It is generally believed that polypi are the consequence rather than the cause of antral suppuration. Bosworth (5) says that polypi are the causes of antral (6) suppuration. And J. H. Bryan takes up the position that polypi may either be the cause or consequence of antral suppuration. While believing that as a rule polypi are caused by antral suppuration I am prepared to admit that there is some truth in the contention of the two writers above referred to, in as much as polypi may have been produced as the result of Ethmoidal disease and subsequently these polypi by more or less occluding the Ostium Maxillare favoured the suppuration in the Antrum itself. But in such cases you might just as well say that the antral suppuration was secondary to Ethmoidal disease.

Now after briefly alluding to these points connected with the etiology of antral suppuration I

shall attempt to discuss its diagnosis. Undoubtedly the first symptom that attracts the attention of the patient as well as of the Rhinologist is discharge from the nose. The discharge is usually of a yellow colour of a fluid consistence and usually with an offensive foetid smell. And unlike cases of atrophic conditions of the nasal mucous membrane the patient can smell the discharge himself.

A great deal of stress has been laid on the unilateral nature of the discharge in cases of empyema of the Antrum. No doubt there is some amount of justification for doing so because in the great majority of cases only one Antrum is affected and the discharge is from the corresponding nostril. While admitting that much, I take the liberty of believing that some writers lay far too great a stress on this

(7) symptom. Lennox Browne says that "the main diagnostic point of antral suppuration is that the discharge is

(8) <sup>A</sup> unilateral". And Dr. M'Bride commenting on Ziem's observations about there being a larger number of cases with affections of both Antra than is usually believed, says - "according to most observers empyema



of the Antrum is rarely bilateral ..... His (Ziem's) experience was in all probability exceptional, as the occurrence of unilateral purulent discharge from the nose is one of the symptoms first arouses the suspicions of the experienced rhinologist". That there is an appreciable number of cases where both the Antra are affected I don't think anyone will dispute. I myself have seen two cases of double antral empyema which were diagnosed and treated by Mr. Cresswell Baber at the Throat and Ear Hospital, Brighton. Besides the cases where both Antra are affected and where you get discharge from both nostrils there are a certain number of cases where only one Antrum is affected and yet you get discharge from both nostrils. Dr. B'Bride says that the discharge from one nostril (9) may get into the other through the posterior nares. So we have not only the cases with double antral affection but also certain cases where only one Antrum is affected which gives a discharge from both nostrils. Therefore in my opinion if undue importance is given to the unilateral nature of the discharge you are apt to miss diagnosing a certain number

of antral empyemas. If there is a unilateral purulent discharge which the patient himself can smell then suspect sinus trouble. If there is such a discharge from both nostrils then still suspect sinus trouble. I think that is a better rule to follow than simply pinning your faith on the unilateral nature of the discharge.

When a patient comes with such a discharge unilateral or bilateral what other symptoms are you to look for? Pain and tenderness over the antral regions has been described as being present. No doubt in a few cases they may be present. But in chronic empyemas they are more often absent than present. Of course one can easily understand that they are more often present in those cases where there are no outlets to the pus from the Antrum. The pain that is usually present in chronic empyemas of the Antrum is in the supra orbital and frontal region. Referring to this Dr. M'Bride says "The possibility of forehead pain and tenderness being due to Antral disease is a matter of great importance as its presence might easily lead to the diagnosis of suppuration"

(10) head pain and tenderness being due to Antral



ation in the frontal or ethmoidal sinus". This pain over the frontal region Dr. M'Bride explains as being caused by the closure of the orifice of the frontal sinus as a result of the swelling of the mucous membrane due to the discharge of pus from the Ostium Maxillare. The closure of the orifice of the frontal sinus leads to the absorption of the contained air and this unnatural condition leads to the pain and tenderness complained of. This state of the frontal sinus may even lead to catarrh of that cavity. I saw one case under Mr. Cresswell Baber in the Brighton Throat and Ear Hospital where a woman came in with purulent discharge from her left nostril. The left Antrum was punctured but no pus was detected. As there was exophthalmos to a marked degree the left frontal sinus was opened when it was found to be full of a mucoid fluid and enormously distended. But there was not a trace of pus in the contained fluid on microscopic examination. Clearly in this case the opening of the frontal sinus must have been thoroughly closed as a result of which a catarrhal condition of the sinus was set up and finding no exit

the discharge accumulated and distended the cavity, and perhaps being safely excluded from the external air suppuration did not take place. In this case the cause of the closure of the frontal sinus opening was most probably ethmoidal disease. I quote this case to show that when the orifice of the frontal sinus becomes occluded on account of antral or ethmoidal disease, you may not only have absorption of the contained air but also a marked catarrhal condition of the sinus. We have then got the purulent discharge from the nose and the pain in the frontal region. Percussion and Succussion has been recommended as diagnostic aids. They may perhaps aid one but I have not had any experience of them. In one case I tried Succussion and though it was undoubtedly a case of empyema of the Antrum as proved by diagnostic puncture I failed to detect anything. But all the same I admit that sometimes both Percussion and Succussion may help one in confirming a diagnosis. Bosworth recommends forcible tapping of the upper molar teeth on the suspected side when if antral disease is present the patient feels pain. I have tried this in several cases with negative result. Perhaps it may

be said that I tapped the teeth too gently. But if one is to knock on the teeth with some force I should think even a patient with a sound Antrum will feel the pain. Careful anterior and posterior Rhinoscopic examination will help one considerably in all cases of suspected antral disease. As I have already said many of these cases are found associated with nasal polypi in which case you have to remove them before proceeding to do anything else. The swollen state of the mucous membrane may be reduced to some extent by the use of cocaine before examination. But when you find pus in the middle meatus, hiatus semilunaris or the infundibulum your suspicion of suppuration in one of the sinuses becomes stronger. More than that, the anterior rhinoscopic examination is of more help in excluding those other causes which may give rise to an unilateral purulent discharge such as foreign bodies and rhinoliths, ulcers, inflammation of bursa pharyngea, ozana, caries &c. When you have excluded these causes and found pus in the hiatus semi-lunaris you have to have recourse to other means to decide as to where the pus comes from. But some authorities



go further and say that by means of rhinoscopic examination they can obtain conclusive evidence as to the locality of the suppuration.

Bosworth says that sometimes you see the pus dropping out of the orifices of one or other of the sinuses in which case you can diagnose the presence of suppuration in that sinus. Yes - If you can see the pus dropping out of any of the orifices you can diagnose. The only difficulty is you have to see it first.

Then there is the appearance described by Walb and Schöller namely that of a pulsating light reflex in the middle meatus. I have never read the description of the phenomenon as given by these two (12) observers. But Bryan says that Walb and Schöller's symptoms which is a pulsating light reflex in the middle miatus is pathognomonie of antral suppuration. (13) Dr. M'Bride in describing the same phenomenon confines himself "to a drop of pus situated in the upper part of the middle miatus, rather anteriorly which occasionally pulsates". This Dr. M'Bride calls "the characteristic feature of antral

suppuration".

I have never seen the pulsating light reflex and I should think that the cases in which you get this symptom must be few and far between, as you are not likely to get this symptom unless the Antrum is full of pus as otherwise the filling of the blood vessels of the antral lining will not be capable of producing the pulsation in the drop of pus at the ostium.

B. Frankel pointed out that in a case of suppuration in the Antrum when you find the middle meatus full of pus if you carefully wipe out all the pus that is present and then make the patient sit on a chair and hang his head down, at the same time holding the head tilted to one side so that the affected Antrum is uppermost, then you have the discharge re-appearing in the hiatus semi-lunaris or the middle meatus. This I believe to be a very important and a very useful test.

(14) Dr. Greville McDonald lays so much stress on this symptom that he says - "Whenever in fact we perceive an opaque canary coloured purulent discharge,

which must be carefully distinguished from the transparent muco pus of simple Rhinitis, lying in the concavity of the middle turbinated body, which discharge after being wiped away is immediately reproduced, we need have no hesitation in opening the Antrum with the strongest possibility of evacuating pus".

The object of placing the patient in that position is to place the suspected Antrum in the most favourable position to drain its contents into the middle meatus. This is very often done unconsciously by the patient himself by lying on the sound side at night, and it is a well known fact that patients suffering from empyema of the Antrum give a history of increased discharge from the nose in the morning. But unfortunately in this position very often the ethmoidal sinus and even the frontal sinus discharge their contents into the middle meatus. I have not seen a frontal sinus discharging in this position, but there is no doubt it would do so if it contained fluid and if its opening was patent. That being the case all that I can say for Frankel's symptom is that when it is present you may suspect either antral, ethmoidal



or frontal sinus troubles. If the pus is present in large quantities then the chances are that it is not from the ethmoidal cells. That leaves upon us the necessity of proceeding to the next step in diagnosing antral empyema. But before leaving Frankel's system let me say that there are instances where on placing the head in what for brevity I will call Frankel's position, the pus has run down the inferior meatus instead of the middle meatus. It is difficult to explain why this should have happened. But Mr. Baber told me that he had seen this occur and that he thought the pus ran over the middle turbinated body. I shall return to Frankel's symptom again in connection with puncture of the Antrum.

Dr. M'Bride says that there are cases where Frankel's symptom is absent, and yet there was suppuration in the Antrum. I have never seen a case like that. But they are probably cases where the ostium is occluded. Where Frankel's symptom has left us in a state of suspicion between antral and ethmoidal affection and to a certain extent of frontal affection as well as we may have recourse to transillumination.

ation of the antra. This valuable aid in the diagnosis of antral trouble was first introduced by Voltolini and consists in placing a small electric lamp inside the mouth of the patient and on the patient closing his lips and darkening the room, noticing the amount of light transmitted through the infra orbital regions. Where you cannot get a perfectly dark room we may throw a perfectly dark cloth over the patient, and the observer like what the photographer does over his head and the camera. This certainly has the advantage in that it does not disturb the other occupants of the room every time you want to transilluminate a patient. And in order to examine all the more accurately whether the infra orbital region is dark or light Dr. M'Bride suggests a black tube through which he looks on to the infra orbital region. This I should think will be an excellent arrangement, though I have never used one or seen one used. Armed with these appliances we proceed to transilluminate the Antra of our patient. In a case where the Antra are perfectly healthy we expect the infra orbital region to light up well and in a case where the Antra

are diseased we expect them to be dark. This in a large number of cases does occur but unfortunately in a great many other cases the result of transillumination is not very reliable. There are two ways in which transillumination is stated to be misleading, (1) it is stated that sometimes Antra which contain pus, light up well on transillumination (2) that Antra which do not contain pus, do not light up at all.

The first of these two contentions namely, that Antra that contain pus, light up well sometimes, is made on the strength of two cases reported by Lichtwitz and Srebny. An attempt has been made by Davidsohn to explain this phenomenon by assuming that the antral cavity above the pus was illuminated by rays of light deflected (?) from the turbinated bodies and an irregular nasal septum. Although I have no explanation of mine to give I have great difficulty in accepting that explanation. But with the exception of the two cases above alluded to, I have never read of any case where the Antrum with pus in it light up. Mr. Cresswell Baber who has lighted up a large number of Antra says that he has never seen one light up yet and had pus



inside, and that seems to be the opinion of a great many surgeons in this country. Dr. Dundas Grant says that if on transillumination the Antra light up, (15) then we may safely exclude empyema of the Antrum. I am inclined to agree with that view. But if transillumination is of value in excluding suppuration in the Antrum, how far does it help you in diagnosing the presence of pus? Not very far I am afraid. Because as I stated above a large number of Antra do not light up and yet contain no pus. Several explanations have been given to account for this. Unusual (16) thickening of bones and a symmetry of the Antra are the causes given by Lennox Browne. Dr. Scanes (17) Spicer who gives the same causes and says "bilaterally symmetrical opacity of cheek tissue and non-illumination of pupils do not indicate double antral empyema, nor do they exclude empyema of one or both Antra. In a large number of healthy subjects, such opacity is found". I myself believe that the failure of Antra to light up is due to thickening or opacity of the lining membrane of the Antrum. I believe that even in cases of simple catarrh, without any sup-

puration whatever, you get the infra orbitals dark to transillumination. I lighted up the Antra of 20 patients who had no symptoms of antral suppuration at all, and I found that in 14 cases both infra orbitals were dark, in 1 slightly so, and in 5 cases the infra orbitals lighted up well. In the case of the 5 patients whose Antra lighted up well, and the one whose infra orbitals were moderately dark, there were no nasal symptoms at all. But in the 14 cases where the Antra remained dark, there was nasal catarrh in 8 cases, polypi in 3 cases and enlargement of the turbinated bodies in 3 with history of previous nasal catarrh. These facts suggested to me the idea that there may have been more or less catarrh of the lining membrane of the Antrum as a result of which a thickening or opacity might have been left which prevented the Antra from lighting up. Moreover it is well known that in a case of empyema of the Antrum after thoroughly emptying the cavity of the contained pus and washing it out, if you light it up the infra orbital remains dark. This can only be explained on the supposition that it is the thickening and opacity of



the lining membrane that is the cause of the Antra not lighting up. If asymmetry (in the sense of difference of  $\alpha$  size as stated by Lennox Browne) of the Antra had anything to do with it, then I should think there will be a difference in the area that is lighted up, but I can't see how asymmetry can make any difference in the intensity of the light that is transmitted through the antral walls. But, however, I must confess that dark Antra on transillumination do not necessarily indicate empyema. But I think that if the Antrum lights up well, it goes a very long way towards proving that there is no empyema there. This negative evidence is of the utmost value, because in a great many cases where we are pretty certain that there is sinus trouble, but unable to diagnose which, it will be a great step if we can exclude Antrum suppuration.

The most conclusive evidence of the presence of pus in the Antrum is to see it and hence the most reliable diagnostic aid at our disposal is puncture of the Antrum. This can be done through the middle meatus, through the inferior meatus, or through



the socket of a molar tooth.

Bresgen suggested the puncture of the Antrum in the region of the hiatus semi-lunaris. This I think adds unnecessarily to the risks of the operation. Puncture from the middle meatus has the disadvantage that it may more likely penetrate the floor of the orbit, while it has no advantage whatever over puncture through the inferior meatus. The puncture through the socket of the molar tooth which was introduced by Ziem has also its drawbacks.

"Sometimes you may have to sacrifice a sound tooth (18) with the possibility of finding oneself mistaken". Then there is a greater thickness of bone to be drilled through in this position than in the inferior meatus. But it has certainly the advantage in one respect, that if pus is detected in the Antrum a second operation is avoided. But on the whole the puncture through the inferior meatus is to be preferred. This was introduced by Moritz Schmidt, and here is a description of the operation in his own words.-

"I commence by inserting a small plug cotton wool into the inferior meatus of the nose under the anterior

portion of the lower turbinated bone, I saturate it with 20 P.C. of cocaine lotion and allow it to remain there for ten minutes. I then raise the anterior portion of the meatus with a hypodermic syringe which I push inwards in an oblique direction, somewhat towards the outer meatus of the ear. If I do not succeed in getting it in at one spot, I try another a little above or further back".

I have seen this done several times by Mr. Cresswell Baber. He uses a straight trocar and cannula and not a curved one as used by Moritz Schmidt. I have never once seen the exploratory needle fail to enter into the Antrum in this way. But after entering the Antrum mere aspiration as practised by Schmidt with a hypodermic syringe sometimes proved unsuccessful. And therefore, after aspiration, air is blown into the Antrum through the cannula by means of an india rubber ball, with a vulcanite nozzle which fits into the cannula. This method was first recommended by Grünwald and I have seen Mr. Baber do this several times with very satisfactory results. In two cases that I saw him puncture the Antrum through the

inferior meatus no pus was detected on aspiration with the hypodermic needle but on blowing air into the Antrum pus was blown out through the Ostium Maxillare into the nasal cavity, and a bubbling sound was heard in the Antrum. I have never seen any bad results follow from these punctures. But safe and reliable as it is there is a source of fallacy even in this. Supposing at the moment of puncture there was no pus in the Antrum, all of it having run out, are you to suppose that there was no empyema present. Therein lies the slight possibility of a mistake. To avoid this Grunwald suggests repeated punctures.

I may here mention that passing a probe through the natural opening has also been suggested.

(20) Hansberg passes a bougie through the Ostium Maxillare and injects a solution of peroxide of hydrogen into the Antrum, and it is stated that if pus is present the middle meatus and the nasal cavity in general becomes filled with a white froth. I do not think the practice is one that is at all safe to follow.

In the first place it is not always a very



easy thing to get a bougie into Antrum through the Ostium Maxillare and secondly the introduction of any substances like peroxide of hydrogen into the Antrum for diagnostic purposes ought to be deprecated.

Before I leave this part of the subject, I may briefly sum up several empyemas, and suspected empyemas of the Antrum (all together over 30 cases) which I saw at the Throat and Ear Hospital, Brighton. In none of the cases of empyemas of the Antrum, did the infra orbital light up on transillumination. Then every case in which Frankel's symptom was present, disease of the Antrum or ethmoid or frontal sinus, was afterwards detected. There were no cases of antral empyemas in which Frankel's symptom was absent. And there were no bad results following on diagnostic puncture through the inferior meatus. Therefore I will draw the following conclusions from the cases I have seen.

(1) Transillumination is a valuable aid in excluding suppuration of the Antra.

(2) That Frankel's symptom is a very valuable aid in diagnosing suppuration of the sinuses.

And when you have once got the symptom, the best means of differential diagnosis is to explore one after the other, the Antrum and Ethmoidal cells and then get to disease of frontal sinus by a process of exclusion.

(3) That diagnostic puncture of the Antrum through the inferior meatus is a safe and reliable procedure, and is undoubtedly the best means as yet at our disposal for the correct diagnosis of Antral Empyemas.

I shall only say a few words about differential diagnosis. The differential diagnosis of antral empyemas from ulcers, foreign bodies, rhinoliths, caries and atrophic rhinitis is very easy as rhinoscopic examination will give you distinct indications of these complaints. According to Dr. M'Bride "unilateral atrophic catarrh" is more often confounded with antral disease (excepting the disease of other sinuses) but on anterior rhinoscopic examination the crusts of the mucous membrane present a different appearance from the thickened mucous membrane and the fluid pus of antral disease. Also in atrophic catarrh the patient cannot smell the discharge himself



whereas in antral diseases he can. The difficult point in the differential diagnosis of antral trouble, is to diagnose it from ethmoidal and frontal sinus disease. I may say at once that in the present state of our knowledge the diagnosis of disease of the frontal sinus is such a difficult matter that you can only in a great many cases arrive at a diagnosis by a process of exclusion. Therefore our first duty is to ascertain the condition of the Antrum and Ethmoidal sinus. In cases where there is evident ethmoidal disease Mr. Baber finds it best to clear away the ethmoidal cells by removing the middle turbinate before puncturing the Antrum. But it is impossible to lay down any definite rule as to this, and each case must be judged on its own merits. He recommends this in order to avoid the possibility of mistakes, by taking the pus from the Ethmoidal cells for that from the Antrum.

(sinuses)

As to the Sphenoidal and posterior Ethmoidal the discharge from these as a rule escape into the naso-pharynx and pharynx. They don't discharge into the middle meatus but into the Superior Meatus. But



it is very difficult to diagnose sinus troubles by the locality in which the discharge is found as the discharge does not seem to be very particular as to where it went. Sudden blindness may come on in some cases of Sphenoidal disease.

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(19) Same as eighteen.

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